

**ANALYSIS OF DATA COLLECTED AT SPECIAL-STUDY SITES
PENNSYLVANIA FLUVIAL GEOMORPHIC REFERENCE REACH NETWORK**

Restoration designs for impaired stream reaches frequently are based on the dimension, pattern, and profile of reference stream reaches that effectively accommodate streamflow and sediment without excessive channel erosion or deposition. Long-term data documenting stream-channel adjustments provide a basis to effectively assess the suitability of a particular reference reach for stream stabilization or other fluvial-geomorphology based projects. Approximately 1,000 feet of Bermudian Creek in Adams County, Pennsylvania (see map below) was selected as the first reference reach within the Pennsylvania Fluvial Geomorphic Reference Reach Network. This reference reach is located near the USGS streamgaging station located near Heidlersburg, PA (USGS station number 01573849). Streamflow data collected at this station also are presented in this report on pages 312-313.

The reference reach was initially surveyed in September 2000 (White, 2001) and again in September 2004 (Durlin and Schaffstall, 2005). The data presented on the following pages were collected from a third survey completed in July 2005. All surveys were consistent with guidelines established by Powell and others (2002). Selected components of the reference-reach surveys are described in more detail below.

The longitudinal profile is a survey along the length of the stream displayed as if viewed from the side, or in profile. There are three components to the longitudinal profile; the bankfull water surface (bankfull stage); the water surface; and the streambed along the line of maximum depth and velocity (thalweg). Locations of surveyed cross sections are plotted on the longitudinal profile along with their respective distance along the reach (station). The slope of the water surface assigned to the longitudinal profile is 0.00661 feet per foot.

Cross-sections are surveyed perpendicular to the stream channel and are displayed as if looking in the downstream direction with station zero being located in the left overbank area. There are four components to the cross-section survey; the streambed, streambanks, and overbank areas (bed and bank surfaces); the water surface on the day of the survey; the bankfull-water surface (bankfull stage); and the water surface at two times the maximum bankfull water depth, or flood-prone width.

For additional information, contact Pete Cinotto at the USGS Pennsylvania Water Science Center, Exton Office, 770 Pennsylvania Drive, Suite 116, Exton, PA 19341; 610-321-2434 (email pcinotto@usgs.gov).

References

- Durlin, R.R. and Schaffstall, W.P., 2005, Water resources data, Pennsylvania, water year 2004, v. 2 - Susquehanna and Potomac River Basins: U.S. Geological Survey Water-Data Report PA-04-2.
- Powell, R.O., Miller, S.J., Westergard, B.E., Mulvihill, C. I., Baldigo, B.P., Gallagher, A.S., Starr, R.R., 2002, Guidelines for surveying bankfull channel geometry and developing regional hydraulic-geometry relations for streams of New York State: U.S. Geological Survey Open-File Report 03-92, 12p. plus appendixes.
- White, K.E., 2001, Regional curve development and selection of a reference reach in the non-urban, lowland sections of the Piedmont Physiographic Province, Pennsylvania and Maryland: U.S. Geological Survey Water-Resources Investigations Report 01-4146, 20p.

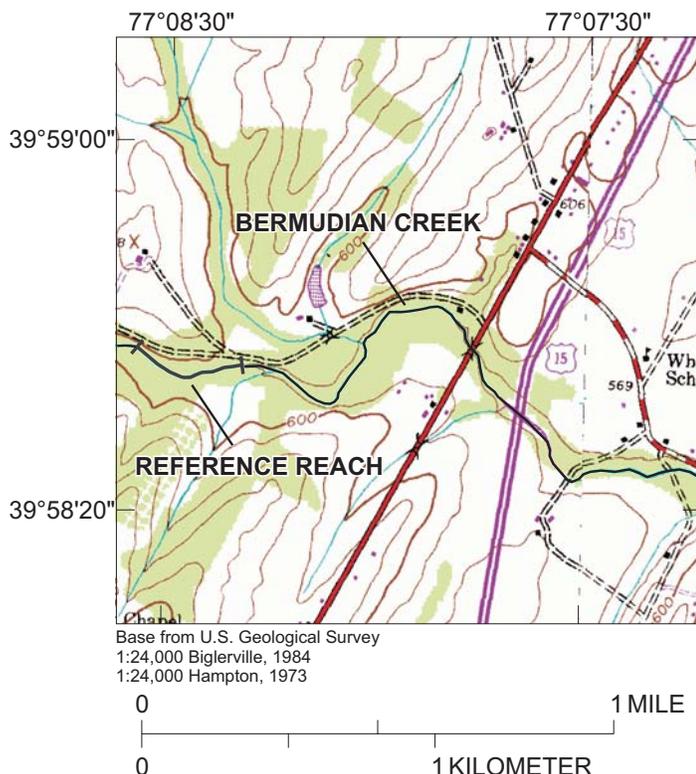
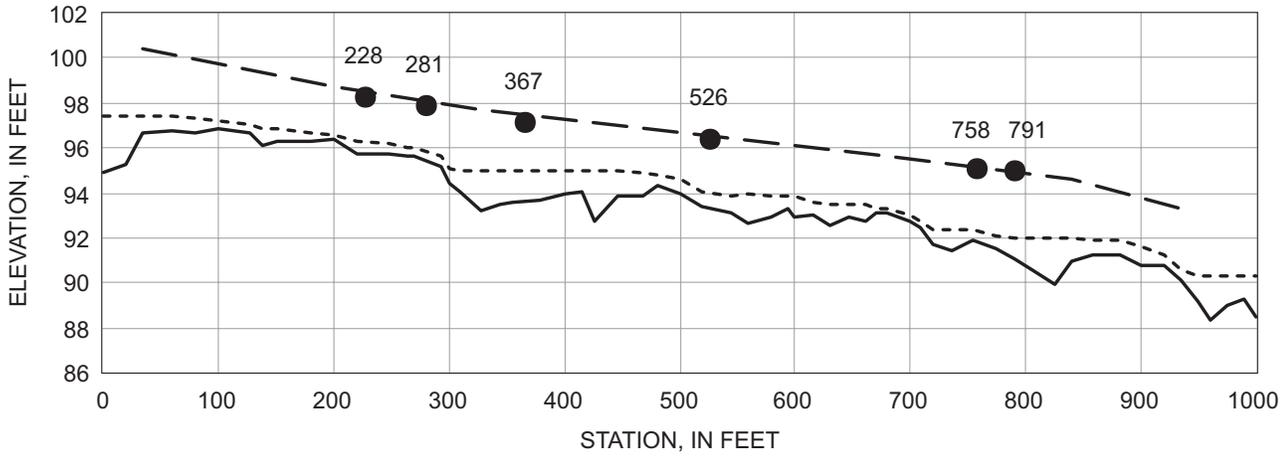


Figure 10.--Map showing the location of a reference reach on Bermudian Creek, Adams County, Pennsylvania.

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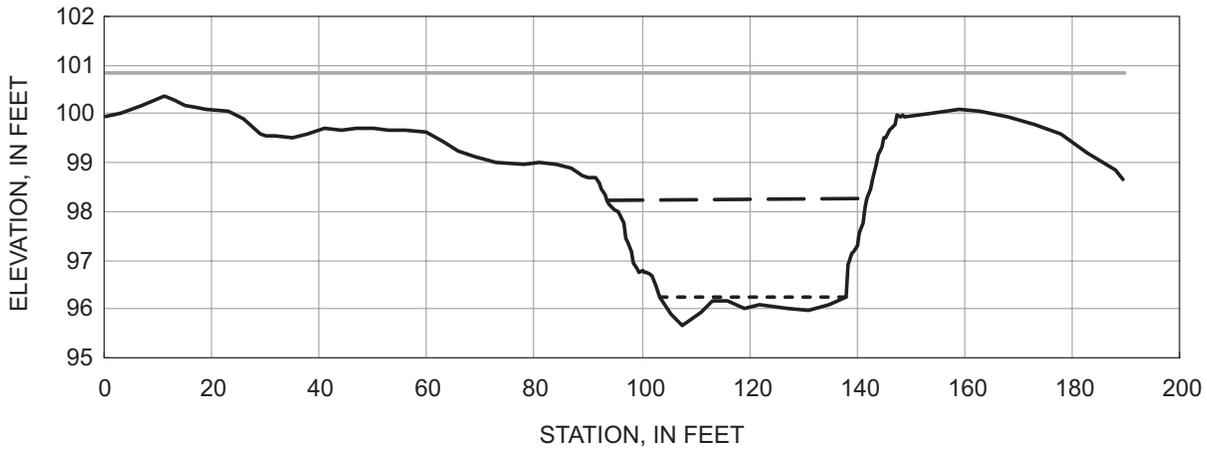
BERMUDIAN CREEK LONGITUDINAL PROFILE



EXPLANATION



BERMUDIAN CREEK CROSS SECTION STATION 228

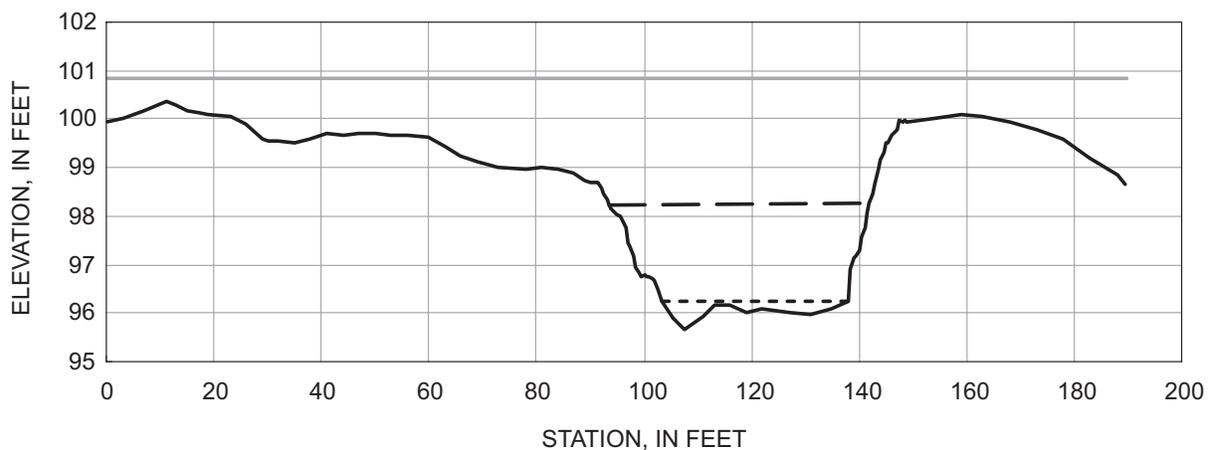


EXPLANATION



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BERMUDIAN CREEK CROSS SECTION STATION 228



EXPLANATION

—————
BED AND
BANK SURFACE

WATER SURFACE

BANKFULL STAGE

—————
TWICE BANKFULL STAGE

Cross-section station	Cross-section type	Bankfull area (ft ²)	Bankfull mean depth (ft)	Bankfull width (ft)	Stream type ^a	D ₅₀ ^b	D ₈₄ ^c
228	RIFFLE	91.1	1.9	48.5	C4	37.8	116.9

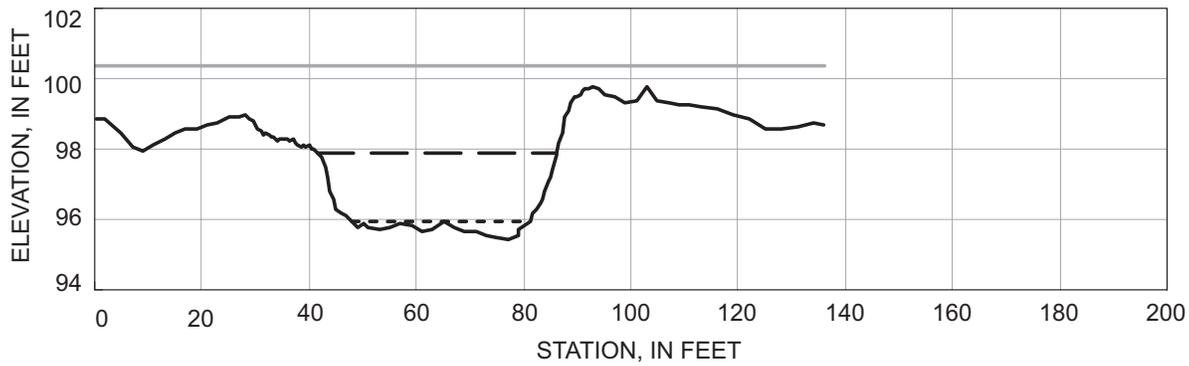
a. Rosgen, 1996 (Stream only classified in riffle sections).

b. D₅₀, particle size larger than 50 percent of cumulative sample.

c. D₈₄, particle size larger than 84 percent of the cumulative sample.

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BERMUDIAN CREEK CROSS SECTION STATION 281



EXPLANATION

BED AND BANK SURFACE WATER SURFACE BANKFULL STAGE TWICE BANKFULL STAGE

Cross-section station	Cross-section type	Bankfull area (ft ²)	Bankfull mean depth (ft)	Bankfull width (ft)	Stream type ^a	D ₅₀ ^b	D ₈₄ ^c
281	RIFFLE	85.2	1.9	44.7	C4	63.4	115.9

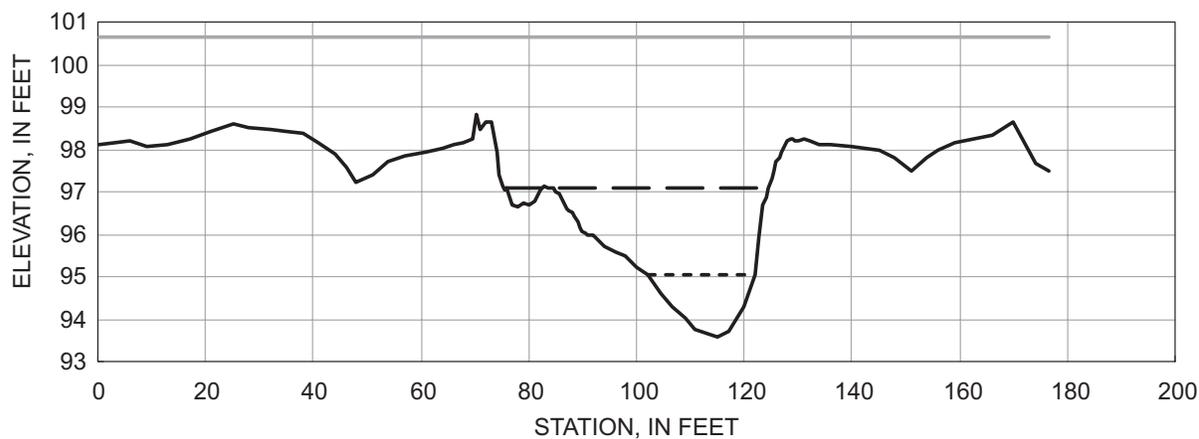
a. Rosgen, 1996 (Stream only classified in riffle sections).

b. D₅₀, particle size larger than 50 percent of cumulative sample.

c. D₈₄, particle size larger than 84 percent of the cumulative sample.

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BERMUDIAN CREEK CROSS SECTION STATION 367



EXPLANATION



Cross-section station	Cross-section type	Bankfull area (ft ²)	Bankfull mean depth (ft)	Bankfull width (ft)	Stream type ^a	D ₅₀ ^b	D ₈₄ ^c
367	POOL	83.8	1.2	48	N/A	21.3	49.6

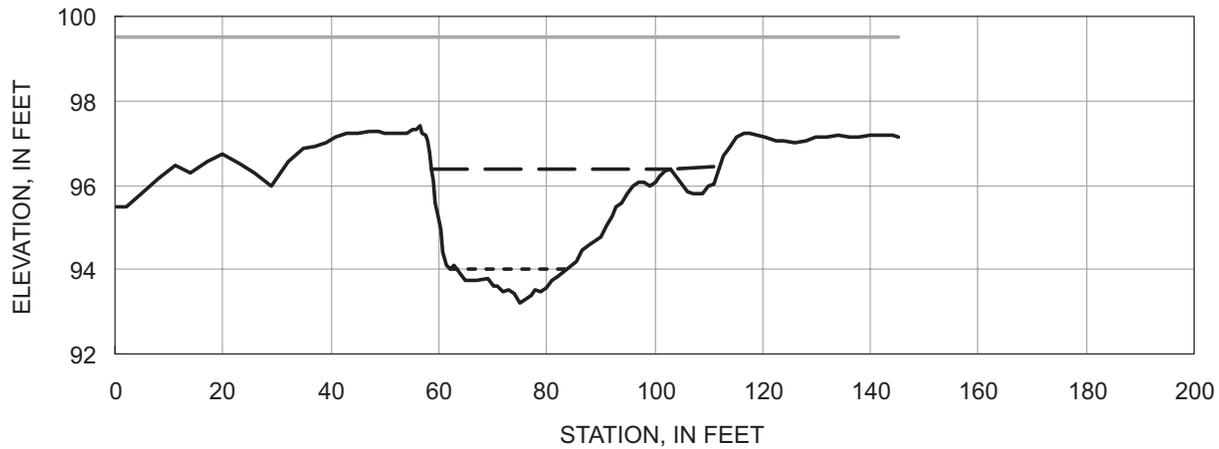
a. Rosgen, 1996 (Stream only classified in riffle sections).

b. D₅₀, particle size larger than 50 percent of cumulative sample.

c. D₈₄, particle size larger than 84 percent of the cumulative sample.

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BERMUDIAN CREEK CROSS SECTION STATION 526



EXPLANATION



Cross-section station	Cross-section type	Bankfull area (ft ²)	Bankfull mean depth (ft)	Bankfull width (ft)	Stream type ^a	D ₅₀ ^b	D ₈₄ ^c
526	RIFFLE	87.2	1.2	53.2	C4	70.8	147.5

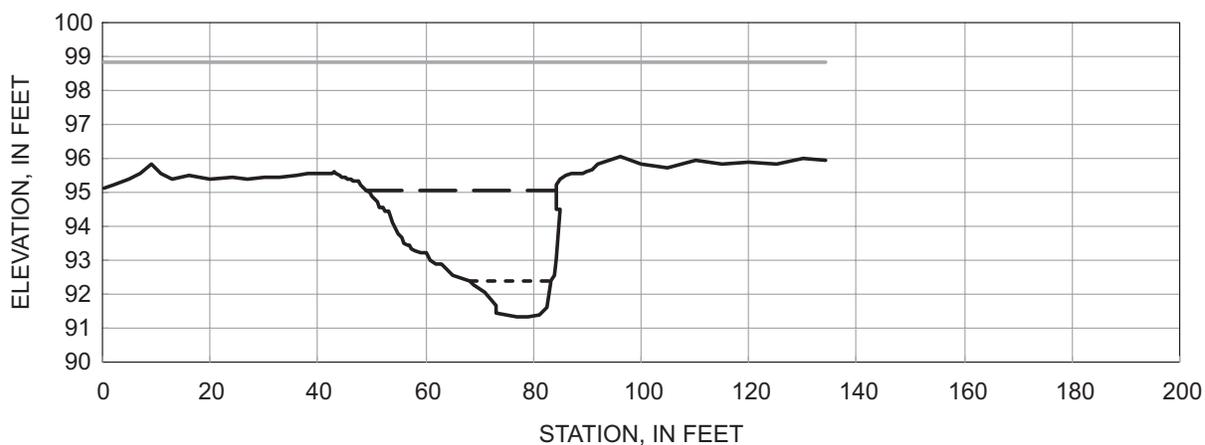
a. Rosgen, 1996 (Stream only classified in riffle sections).

b. D₅₀, particle size larger than 50 percent of cumulative sample.

c. D₈₄, particle size larger than 84 percent of the cumulative sample.

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BERMUDIAN CREEK CROSS SECTION STATION 758



EXPLANATION

BED AND BANK SURFACE WATER SURFACE BANKFULL STAGE TWICE BANKFULL STAGE

Cross-section station	Cross-section type	Bankfull area (ft ²)	Bankfull mean depth (ft)	Bankfull width (ft)	Stream type ^a	D ₅₀ ^b	D ₈₄ ^c
758	POOL	85.8	2.4	35.3	N/A	46.4	188.8

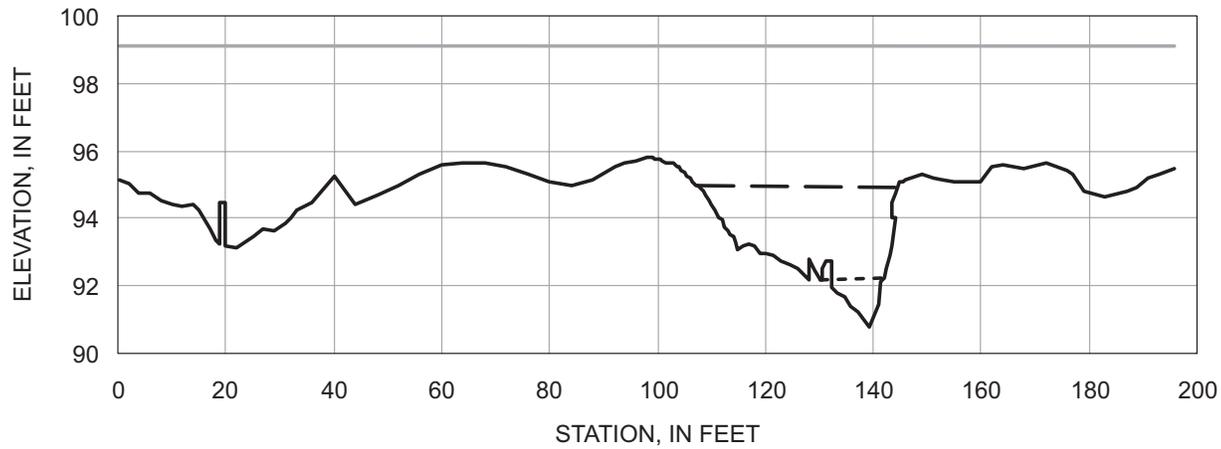
a. Rosgen, 1996 (Stream only classified in riffle sections).

b. D₅₀, particle size larger than 50 percent of cumulative sample.

c. D₈₄, particle size larger than 84 percent of the cumulative sample.

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BERMUDIAN CREEK CROSS SECTION STATION 791



EXPLANATION

BED AND BANK SURFACE

 WATER SURFACE

 BANKFULL STAGE

 TWICE BANKFULL STAGE

Cross-section station	Cross-section type	Bankfull area (ft ²)	Bankfull mean depth (ft)	Bankfull width (ft)	Stream type ^a	D ₅₀ ^b	D ₈₄ ^c
791	POOL	82.8	2.2	37	N/A	86.4	170.4

a. Rosgen, 1996 (Stream only classified in riffle sections).

b. D₅₀, particle size larger than 50 percent of cumulative sample.

c. D₈₄, particle size larger than 84 percent of the cumulative sample.